

## IMPACT EVALUATIONS 10/17/02 WRAC

### Create Section 1.7.3 of the BOR to read:

**1.7.3. Impact Evaluations.** The following is intended to ensure that each permit application is based on consistent, reliable technical evaluations conducted using accepted industry or professional standards. When determining whether the permit applicant has provided reasonable assurances that the conditions for permit issuance are met, the District will consider the projected impact of the proposed withdrawal, along with impacts from any existing legal uses and other pending applications for a consumptive use permit, during a 1 in 10 year drought event. These assurances can be provided through applicable historic monitoring data or modelling data, as defined below. applicable monitor and modeling data, the extent to which the requested allocation is for the historic actual documented use and it is demonstrated that such use did not cause harm to the water resources and did not interfere with presently existing legal uses, during conditions up to a 1 in 10 year drought event. Such demonstration will include consideration of monitoring data, existing legal uses, past compliance with limiting conditions in the permit, enforcement history, and evaluation of past and current conditions of the water resources within the area of influence of the proposed withdrawal.

**1.7.3.1 Monitor Data.** Applicability of monitor data applies to accurate verifiable data that has been collected at the represented withdrawal rates requested in the permit application during at least a 1 in 10 drought year as defined by the yearly total rainfall accumulation for regulatory rainfall stations pursuant to SFWMD, Part B Water Use Management System Design and Evaluation Aids, Part V, Supplemental Crop Requirement and Withdrawal Calculation, within Volume 3 Permit Information Manual for Water Use Permit Applications. Pumpage data that was collected from a calibrated accounting method that was authorized in the previous permit is considered accurate and verifiable. Water level and quality data collected pursuant to limiting conditions in a permit must provide sufficient information to determine if conditions of permit issuance will be met. Additional assurances will be required in cases where the monitor data does not represent the conditions of the resource as affected by the past withdrawals. An example would include wetland photographs without corresponding hydrologic data necessary to determine the withdrawal impacts on wetland hydroperiod, or water quality data from monitor wells that have collapsed or are constructed into zones that don't relate to potential for salinity movement.

The use of historic monitor data to prove conditions of permit issuance are met may be applied to permit renewals and to that portion of a modification that represents the historic use that was monitored. Additional assurances will be required in case where a modification renders the historic data non-

representative. An example would include the use of new source of supply, a significant relocation of the points of withdrawal, or an increase in the allocation.

**1.7.3.2 Modeling Data.** Applicable modeling data may consist of basic analytic impact assessments or calibrated numeric system simulation models. The modelling impact assessments are to be run for the proposed withdrawal alone, as well as the proposed withdrawals combined with all other permitted uses and pending applications within the cone of depression of the proposed use. The cone of depression is defined by the 0.1 foot drawdown contour for withdrawals from the water table aquifer and the 1.0 foot contour for withdrawals from a confined aquifer.

**A. Basic analytic impact assessments:** Basic analytic impact assessments utilize an approved analytic equation(s), such as the Theis or Tleaky equation, applied to the requested maximum month allocation that simulates continued withdrawal for 90 days without recharge (which is considered for purpose of these simulations to be equivalent to a 1 in 10 drought condition). Aquifer characteristics derived from approved aquifer performance tests (APT) or specific capacity test (SFWMD, Part B Water Use Management System Design and Evaluation Aids, Part II Aquifer Performance Test) located within one mile of the project simulated well site are acceptable. If the location of the nearest site where aquifer characteristics were measured nearest acceptable APT site is greater than one mile from the project simulated well site, the average of the nearest three APT sites is acceptable providing that two of the three values are within unless the difference between the calculated mean and the single value furthest from the mean is greater than one standard deviation of the mean. If this is not the case, the applicant shall demonstrate that the conditions of permit issuance are met analytic equation must be done for the highest and lowest value of the three sites or the applicant may opt to conduct on APT at the site.

The use of numeric models such as Modflow without calibration is acceptable under the following configurations: 1) when the model represents the aquifer as a single layer; 2) a single value is used for transmissivity/permeability, storage/storativity, and leakance; 3) the methods used to calculate the aquifer characteristics follow the methodology described above; and 4) the simulation time is 90 days with no recharge. — when configured as a single layer and run for 90 days with no recharge, is also acceptable. —The use of numeric models without calibration for the purpose of evaluating various water supply options in the formulation of the application is encouraged. However, when used for providing reasonable assurances that the conditions of permit issuance are met, the analytic impact assessment method shall comport with the criteria outlined above.

**B. Calibrated numeric system simulation models:** For complex systems that cannot be accurately evaluated pursuant to paragraph A, In some cases, it may be desirable for the applicant may provide assurances that the conditions for issuance will be met through a calibrated numeric simulation model. to simulate

more complex interactions within the surface and groundwater regime in order to provide assurances that the conditions of permit issuance will be met. District approved numeric system simulation models are used to simulate withdrawals complex aquifer systems, such as multiple layered aquifers with varying degrees of hydraulic conductivity, integrated surface and groundwater systems, withdrawals that involve density dependent flows, or transport of contaminants. may be used in these in instances.

Staff will approve simulations that utilize documented accepted model codes that have undergone professional peer review and accurately represent the physical system. In order to demonstrate that a model is representative of the physical system, the applicant shall calibrate the model. Establishment of an acceptable calibration criteria shall be identified between the applicant and District staff while taking into consideration the range of water levels across the model domain, location of available water level monitor data, and the degree to which the monitor data accurately reflects area ground water conditions versus sporadic influences of local pumpage. Whenever possible, the Nnumeric models should strive are to be calibrated to within  $\pm 1$  foot for at least three monitor wells distributed randomly within the model domain for each month of the simulation period. The applicant may identify monitor wells that are not acceptable for calibration due to sporadic influence by local pumpage. Under such conditions the applicant may identify other monitor wells for calibration purposes. (the 1 in 10 drought year).

For the purpose of model calibration, when using monitor data that has daily measurements, the applicant shall average those daily values for each month. For monitor wells in which a single measurement was made for the month, the acceptability of the calibration will consider the pumpage and rainfall conditions conditions immediately preceding or during that sampling event, in determining whether the 1 foot calibration criteria is met.

Model calibrations will be conducted using monthly time steps for a calibration timeframe of at least 18 months. The applicant may select the calibration period for the model based on availability of representative time variant data. The simulation model run shall be conducted using monthly time steps starting with a minimum of three months of average annual demand and rainfall, followed by twelve months of 1 in 10 drought conditions, followed by a minimum of six months of average annual demand and rainfall. The applicant shall utilize SFWMD, Part B Water Use Management System Design and Evaluation Aids, Part V. Supplemental Crop Requirement and Withdrawal Calculation, within Volume 3 Permit Information Manual for Water Use Permit Applications, to determine the 1 in 10 drought and average rainfall conditions for the purpose of evaluating drought recharge rates.

When district staff evaluates a calibrated model for approval, the range of parameters used in the model will be checked against published ranges of values for each parameter evaluated in order to determine the reasonableness of the values used in the model. Calibrations that are achieved using parameters that are outside of the range of acceptable values for South Florida will not be acceptable. Steady state numeric models are not acceptable for the purposes of providing reasonable assurances.

The location of all actual measured time invariant parameters used to estimate each data array shall be identified and documented for each layer in the model. Data arrays without at least 3 actual measured values will require a sensitivity analysis to be conducted that evaluates the range of potentially possibly acceptable values for the parameter in question. If a model is submitted that does not meet the calibration criteria, the applicant may collect additional data and revise the model. If a model is not calibrated to an acceptable level it will not be acceptable for providing reasonable assurances.

The calibrated numeric system simulation models are to be run for the proposed withdrawals alone as well as with the proposed withdrawals combined with all other permitted uses and pending applications within the cone of depression of the proposed use. The cone of depression is defined by the 0.1foot drawdown contour for withdrawals from the water table aquifer and the 1.0 foot contour for withdrawals from a confined aquifer.